Hydraulic fill procedure

This procedure covers filling of an empty bubble chamber with degassed mineral oil.

After water distillation, the bellows should be at approximately midstroke: above the neutral position, but not fully extended. The chamber should be filled with liquid.

1. The empty pressure vessel should have been leak checked prior to this procedure. Insert the inner vessel and seal the pressure vessel using the appropriate procedures.

2. Ensure that the foam lid is over the water bath reservoir and fill the holes with oil-absorbent blankets. This will prevent oil from mixing with the water bath and being pumped through the NESLAB.

3. Run the Labview VI. Start data logging every 60 seconds.

4. For the filling procedure, AC-002 should have a plug installed on its top port. Set the pressure in AC-001 to 50psi using the Schrader valve. Vent AC-002 to atmosphere, then seal it.

5. Fill the mineral oil source jug and attach it to the line from the mineral oil reservoir. Check that MV-018 is closed.

6. Connect MV-019 to a vacuum pump. Open MV-019.

7. Open all manual valves in the hydraulic system (MV-003, MV-004, MV-005, MV-006, MV-014, MV-016, MV-017). Make sure all valves to the inner chamber are closed.

8. Pump down on MV-019 until the hydraulic system and reservoir system is evacuated.

9. Close MV-017. Check that the pressure in the hydraulic system does not increase.

10. Open MV-018 to fill the reservoir with mineral oil. Close MV-018 before the fluid level reaches the bottom of the line to the reservoir. Ensure that more mineral oil is in the reservoir than required to entirely fill the hydraulic system. Continue pumping on this fluid until all the oil is degassed. Record the initial volume of oil in the reservoir.

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11. Using a vacuum pump, pump down on MV-014 until the system has been completely evacuated. If the piping is entirely free of leaks, this step should be redundant.

12. Close MV-014 and disable the vacuum pump. Immediately open MV-017 to start filling the hydraulic system with oil. Watch fluid level dropping in reservoir. Once it has stopped, record the volume of oil in the reservoir.

13. Vent reservoir to atmosphere. If oil begins flowing again, allow fill to continue until it stops, and record the volume of oil in the reservoir.

14. Close MV-016 and MV-004.

15. Run PU-001 until PT-002 reads approximately 200psi. This will happen very quickly (<2s). This step draws fluid directly from the reservoir to fill the accumulators. At this point, AC-001 should be approximately three-quarters full. Record the volume of oil in the reservoir.

16. Close MV-005, MV-006, and MV-014. No more oil will enter the system after this. The oil source bottle, reservoir, and transfer lines may now be removed if so desired.

17. Run compression-expansion cycles until PT-002 reads approximately 100psi. At this point, each accumulator is approximately half-filled with hydraulic fluid.

18. Clean up any oil spillage and oil residue from off the system.